Chapter 4: Potential Development Areas

“Change is the law of life. And those who look only to the past or present are certain to miss the future.”
— John F. Kennedy

4.1 Introduction

This chapter presents a discussion and calculations that translate the forecasts of aviation activity developed in Chapter 3 into facility and/or land area requirements to accommodate the forecast aviation activity. It then presents possible development areas and/or concepts to accommodate the requirements, including relevant planning considerations, such as operational, financial, environmental, and other issues. The chapter has five main parts: (1) airline passenger development, (2) air cargo development, (3) general aviation development, (4) airline-related support facilities development, and (5) ground access development. Potential airfield development is discussed in Chapter 5.

FAA AC No. 150/5070-6A, Chapter 6, discusses requirements, analysis, and concepts development. Although Chapter 6 of the AC does not directly address individual master plan elements (i.e., airline passenger development, air cargo development, general aviation development, etc.), it does provide planning principles and guidance. Chapter 6 of the AC discusses comparing requirements for various facilities and/or land areas (based on the forecasts of aviation activity) to the existing facilities and land areas to determine if there are any deficiencies and, if new facilities and/or land areas are required, if there is area on the airport to do so (see Chapter 6, Sections 2 (Demand-Capacity Analysis), 3 (Development Assessment), 4 (Land-Use Criteria), 5 (Terminal Planning Criteria), and 6 (Alternatives Review)). According to Chapter 6, Section 3 (Development Assessment), “In addition to determining the physical capability for expansion, as well as its timing based on development costs versus delay reduction benefits, operational reliability and safety are critical considerations.” This chapter of the master plan is based on the planning principles and guidance contained in FAA AC No. 150/5070-6A.

4.2 Airline Passenger Development

This section presents aircraft gate requirements for the near-term planning horizon (2010 to 2012) and land area requirements for potential terminal development for the long-term planning horizon to accommodate the airline passenger forecasts developed in Chapter 3. This section then presents potential terminal development areas on the Airport and potential terminal development concepts.

4.2.1 Requirements (2010 to 2012)

In Chapter 3, it was determined that the Airport would need to accommodate between 18 to 20 MAP in the 2010 to 2012 timeframe. These airline passengers (and the associated aircraft that they arrive or depart on) would use existing terminal buildings and gates (29 gates total in Terminals 1 and 2 combined, after completion of current construction projects), plus additional terminal buildings and gates, if required. This section presents discussion and calculations to determine if new gates (more than the 29) would be required to meet the near-term airline passenger forecasts (18 to 20 MAP).

The first estimate of aircraft gates requirements was calculated based on targets for average daily departures per gate and peak month (August) passengers per gate. This estimating technique considers the concept of passenger and airline level of service or intensity of usage of the facilities. Although it is important to maximize use of expensive resources like terminal buildings and aircraft gates, excessive usage can lead to uncomfortable conditions for airline passengers, challenging operations for the airlines, and difficulty for the Port in maintaining the facilities. A balance is required. For example, although it might be possible to “staff” 18 MAP through 29 aircraft gates, it would likely result in an extremely poor level of service for passengers and airlines (e.g., dirty restrooms, overcrowded holdrooms and concessions, long security checkpoint lines, “tight” aircraft parking positions, cancelled flights to replace or maintain facilities, etc.).

For planning purposes, the master plan assumes between 6 and 6.5 average daily departures per gate per day. This assumption is considerably less than existing conditions (at 6.6 average daily departures per gate per day, see Section 2.3), but greater than other Bay Area airports (which range from about 4 to 6 average daily departures per gate per day) and the national average (of 5.5 average daily departures per gate per day).

Average daily departures per gate per day of between 6 and 6.5 represents a reasonable balance between maximizing use of facilities and level of service. As shown in Table 4.1, this gate use assumption yields between 46 and 50 total aircraft gates at OAK to accommodate 20 MAP, or between 17 to 21 gates more than existing gates plus those currently under construction (i.e., 29 gates). Table 4.1 also shows gate use in terms of peak month passengers per gate. Again, compared to the

<table>
<thead>
<tr>
<th>Total Aircraft Gate Requirements</th>
<th>Table 4.1</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>18 MAP(1)</td>
</tr>
<tr>
<td>August(3) Passengers (A)</td>
<td>1,737,457</td>
</tr>
<tr>
<td>Daily Operations (B)</td>
<td>542</td>
</tr>
<tr>
<td>Daily Departures (B÷2=C)</td>
<td>271</td>
</tr>
<tr>
<td>Assumed Average Daily Departures per Gate(4) [X]</td>
<td>Total Gate Requirements [C÷X=Y]</td>
</tr>
<tr>
<td>6.0</td>
<td>46</td>
</tr>
<tr>
<td>6.5</td>
<td>42</td>
</tr>
<tr>
<td>Assumed Average Daily Departures per Gate</td>
<td>Average Passengers per Gate(5) [A÷Y]</td>
</tr>
<tr>
<td>6.0</td>
<td>37,771</td>
</tr>
<tr>
<td>6.5</td>
<td>41,368</td>
</tr>
</tbody>
</table>

(1) Approximately 2010; (2) Approximately 2012; (3) Peak Month; (4) In August 2004, the Airport had an average of 8.9 daily departures per gate (from 24 gates); (5) In August 2004, the Airport had an average of 56,504 passengers per gate (from 24 gates).
passenger per gate data presented in Section 2.3, the proposed peak month passengers per gate is reduced over existing conditions (offering an improved level of service and the ability to perform maintenance without ceasing operations), but still greater than other airports (making better use of facilities).

In addition to the aircraft gate planning methods described above, the airline passenger flight schedule (contained in Appendix H) was used to test the number of gates required. Based on this hypothetical flight schedule, the number of gates occupied simultaneously was counted based on the hypothetical flight schedule, the number of gates required to accommodate the flight schedule driven by demand for 20 MAP in about 2012. It should be noted that the prior ADP environment documents evaluated up to 34 total aircraft gates at OAK, or 5 more than currently exist plus those under construction. Compared to 34 gates evaluated in the ADP environmental review documents, the requirements presented above represent between 12 and 16 more aircraft gates.

4.2.2 Requirements (2025)

For 2025, the anticipated number of aircraft gates is calculated and translated into a land area requirement. Terminal concepts for 2010 to 2012 can then be evaluated for the relative ease to grow beyond the 46 to 50 aircraft gates described above. Detailed aircraft gate or terminal building planning beyond the 2010 to 2012 timeframe is highly speculative. As described in detail in Chapter 5, the main air carrier runway at OAK (Runway 11-29) can accommodate the aircraft operations anticipated in the 2010 to 2012 timeframe and perhaps slightly beyond, with some modest increase in delay. However, Runway 11-29 would not be able to accommodate aircraft operations likely to be associated with 30 MAP (i.e., the long-term planning horizon in about 2025), assuming that there is no significant changes in the aircraft fleet serving OAK (see Chapter 5 for further discussion). Therefore, it is unlikely that many more aircraft gates would be required beyond the 46 to 50 gates described in Section 4.2.1 (required in the 2010 to 2012 timeframe). So, while it is prudent to look at the potential expandability of future terminals and aircraft gates, the need for additional gates might not ever come to fruition (due to the capacity of Runway 11-29), and therefore additional gates (beyond 46 to 50 total gates) are not recommended in the master plan.

The first step is to determine a range of gate requirements to accommodate 30 MAP (in about 2025). Based on calculations shown in Appendix G, it is estimated that between 65 and 75 total aircraft gates would be required to serve 30 MAP, assuming a similar aircraft fleet mix as today, or between 15 and 25 gates beyond what is required in 2010 to 2012 timeframe. The next step is to estimate how much land area is required per aircraft gate. Based on data from prior Port studies, it is estimated that 2.2 acres is required for each aircraft gate. The final step is to calculate the likely range in area required for the additional 15 to 25 aircraft gates. It is estimated that 33 to 55 acres would be required to provide an additional 15 to 25 aircraft gates over and above the area required for the 46 to 50 aircraft gates required in 2010 to 2012. The calculations summarized above are contained in detail in Appendix G.

The following section discusses potential terminal development areas and concepts based on 18 to 20 MAP terminal building and aircraft gate requirements (i.e., 46 to 50 total aircraft gates, or between 17 and 21 more gates than existing plus those under construction). The long-term area requirements to accommodate 30 MAP can be used to evaluate the various areas and concepts for relative future expandability (again, assuming additional air carrier runway capacity is available).

4.2.3 Potential Terminal Development Areas and Concepts

Figure 4.1 shows three potential areas for future terminal development at OAK. Area 1 is located in the Central Basin, south of Ron Cowan Parkway, west of the FedEx Metroplex. Any terminal development in Area 1 would require a substantial amount of wetlands fill. Area 2 is located in the existing passenger terminal area, south of Ron Cowan Parkway, east of Taxiway B, north of Taxiway T, including the Oakland Maintenance Center. Area 3 is located east of Terminal 2, largely in San Francisco Bay. Planning considerations for each area are shown on the various potential terminal development concepts located in each of the three areas. Potential terminal development Concepts 1A and 1B are located in Area 1; potential terminal development Concepts 2A through 2I are located in Area 2; and potential terminal development Concepts 3A and 3B are located in Area 3. Planning considerations examine operational, environmental, financial, engineering, and other issues associated with each potential terminal concept.

Figure 4.2 and Figure 4.3 show two potential terminal development concepts (1A and 1B) in Area 1 with appropriate planning considerations. Potential terminal development Concept 1A could be constructed to replace the existing terminal complex (plus those gates under construction) as well as provide the new 17 to 21 aircraft gates required in the 2010 to 2012 timeframe (for a total of 46 to 50 total aircraft gates). The existing terminal complex could then be redeveloped. Potential terminal development Concept 1B shows a new 20-gate unit terminal. Both potential terminal development concepts allow for “greenfield” site development and provide good access to the main air carrier runway, Runway 11-29. However, both concepts in Area 3 have considerable issues involving development in wetlands that would need to be overcome, including environmental, engineering, and financial challenges, as outlined in the planning considerations on each concept.
Figure 4.4 and Figure 4.5 show two potential terminal development concepts (2A and 2B) in Area 2 with appropriate planning considerations. For all of the potential terminal development concepts in Area 2 with the exception of Concept 2G, the cargo building would need to be relocated out of the center of the planning area. The cargo building houses United Parcel Service (UPS), belly cargo, the United States Post Office, as well as airline operations and provisioning space. For the purposes of considering terminal concepts in the master plan, it is assumed that the cargo building would be relocated to the Oakland Maintenance Center site south of Ron Cowan Parkway. Potential terminal development Concepts 2A and 2B add 20 gates onto the existing Terminal 1 complex. Although Concept 2A has several benefits outlined in the planning considerations, it would likely have difficult curbside operations. Concept 2B is similar to Concept 2A, but enhances landside circulation by providing a separate, consolidated baggage claim building and new baggage claim curbside roadway (splitting the enplaning and deplaning curbsides). This concept shows the existing baggage claim areas in Terminals 1 and 2 also being relocated (consolidated) in a new baggage claim building with a new curbside. Although it would likely improve landside access and circulation, it is unclear how the existing baggage claim areas in Terminals 1 and 2 would be reused and how passenger circulation would work. Further, underground or elevated baggage conveyors would need to be constructed to transport baggage from arriving flights on the airside, under or over the roadways, to the new baggage claim building.

Figure 4.6, Figure 4.7, Figure 4.8, Figure 4.9, and Figure 4.10 show potential terminal development concepts (2C through 2G) in Area 2 with appropriate planning considerations. Each concept shows a 20-gate unit terminal (not directly connected to the existing Terminals 1 and 2 complex) east of and parallel to Taxiway B. In each case, a new taxiway is also shown parallel and east of Taxiway B. This taxiway would be required to allow unimpeded, two-way aircraft taxi movements to and from the unit terminal. As described in more detail in Chapter 5, this new taxiway would also minimize delay and congestion associated with head-to-head taxi events on Taxiway B (for example, when a corporate jet at North Field taxis southbound to depart Runway 11-29 versus an aircraft taxiing northbound on Taxiway B), such as a FedEx aircraft going to the Metroplex after landing). Arrows on the drawings indicate potential future expansion areas, if such expansion was ever pursued.

Potential terminal development Concept 2C (Figure 4.6) shows a terminal layout farther to the south in Area 2; Concept 2D (Figure 4.7) shows a more northerly terminal layout; Concept 2E (Figure 4.8) shows a more southerly layout with some of the more northerly aircraft pushing back onto the new taxiway parallel to Taxiway B. Concept 2F (Figure 4.9) shows a terminal complex where the terminal building (e.g., ticket counters and baggage claim) is separated from the concourse (e.g., holdrooms) to allow for a bypass roadway to the existing Terminals 1 and 2 complex; and finally, Concept 2G (Figure 4.10) shows a terminal complex on the Oakland Maintenance Center site. The planning considerations for each concept are shown on the figures.

Figure 4.11 and Figure 4.12 show potential terminal development concepts suggested by a City of Alameda and a City of San Leandro representative on the Stakeholder Advisory Committee, respectively. As stated before, input and recommendations provided by members of the Stakeholder Advisory Committee on potential future terminal development should not necessarily be considered implicit endorsement of future terminal expansion at OAK. Figure 4.11 (Concept 2H) shows only the concourse (e.g., holdrooms) in Area 2, while the terminal building (e.g., ticket counters and baggage claim) is located off-Airport. The two separate facilities would be connected by an automated people mover. That is, airline passengers would check-in at a remote (off-Airport) terminal and then take a people mover to the aircraft gates. Arriving passengers would deplane and take the people mover to the terminal building to collect checked baggage and access parking and other ground transportation. Although this concept does have the potential to locate parking and other ground transportation modes closer to Interstate Highway 880, it has a number of significant issues outlined in the planning considerations on Figure 4.11. Figure 4.12 shows a potential terminal development concept with landside facilities (e.g., parking and roadways) located farther north (closer to Ron Cowan Parkway) and the existing surface parking lot and landside portion of Terminals 1 and 2 converted to aircraft ramp and gates. Although this concept creates a consolidated terminal building, it would likely be very expensive due to the extensive renovation of existing facilities and provides relatively long walking distances to some of the aircraft gates. Other planning considerations are shown on the figure.

Figure 4.13 and Figure 4.14 show two potential terminal development concepts (3A and 3B) in Area 3 with appropriate planning considerations. Concept 3A (Figure 4.13) shows a 7-gate extension of the Terminal 2 extension project. This concept does not meet the requirements described in Section 4.2.1 (i.e., 17 to 21 aircraft gates in the 2010 to 2012 timeframe). Although this concept provides additional aircraft gates, it does not provide any additional terminal building facilities, such as ticket counters, baggage claim, security checkpoint lanes, curbside roadways, etc., which would likely be required to accommodate the increased number of aircraft gates and airline passengers. It is also unclear whether this concept could be constructed due to height limitations imposed by protected airspace for the approach to Runway 29. Concept 3B (Figure 4.14) shows a 20-gate expansion of Terminal 2 into San Francisco Bay. Both figures contain relevant planning considerations.

4.2.4 Recommended Terminal Development Area

It is recommended that the Port further study potential near-term terminal development concepts in Area 2 in accordance with the requirements outlined in Section 4.2.1 (i.e., 17 to 21 aircraft gates in the 2010 to 2012 timeframe).
timeframe). It appears that Areas 1 and 3 would be difficult to develop from an engineering and environmental perspective, requiring considerable fill of wetlands and/or San Francisco Bay. Further, because of the engineering and environmental challenges, Areas 1 and 2 would likely be considerably more expensive (possibly unaffordable) to develop for terminal uses than Area 2. From a land-use perspective, Area 2 is convenient to the existing terminal area. Now that the Oakland Maintenance Center is available, it is possible to demolish it and use the area for terminal or facilities displaced by terminal development in Area 2, such as the cargo building.

Potential terminal development Concept 2C (Figure 4.6) is assumed for the purposes of the airfield analyses discussed in Chapter 4. This is not a preferred concept, but one example of many possible terminal concepts (several of which are described above and shown in the figures). For the airfield analyses, the modeler must know where the required aircraft gates are located in order to simulate aircraft taxiing on the taxiway system.

It is important to note that although several potential terminal development concepts were developed and evaluated, the master plan is focused on overall Airport land-use guidance. The concepts simply demonstrate that there are a variety of possible terminal configurations that are possible in each area. Even though this master plan recommends future terminal development be considered in Area 2, this master does not recommend a specific terminal development concept. The Port will be proceeding with separate studies to develop and further evaluate the feasibility of terminal concepts within Area 2.

As described above, potential long-term (2025) terminal development (i.e., a significant number of additional gates beyond 46 to 50 total aircraft gates required in the 2010 to 2012 timeframe) is not recommended in the master plan due to capacity constraints on Runway 11-29.

4.2.5 Stakeholder Advisory Committee Recommendations

Although some Stakeholder Advisory Committee representatives are concerned about any Airport development, the majority favored potential terminal development in Area 2. According to the stakeholders, Area 2 has fewer environmental challenges, already contains the other terminals, and is farther away from the surrounding communities.

The City of San Leandro representatives to the Stakeholder Advisory Committee indicated that they prefer potential terminal development concepts that are farther south, closer to the existing terminal area. They felt that terminal development farther north could encourage airlines to start using the runways at North Field, especially for landings, as Runway 11-29 at South Field becomes more congested. Port staff explained that the exact placement of terminal facilities within Area 2 would not likely influence whether airlines would choose to use the runways at North Field. Compared to other U.S. airports, any aircraft gates constructed in Area 2 would still be quite conveniently located relative to Runway 11-29 at South Field (i.e., taxi times to/from Runway 11-29 would still be quite reasonable). Also, aircraft landing at North Field have a considerable distance to travel to get to any gates at South Field due to circuitous taxi routes and at least two runway crossings (three if landing on Runway 27L). Further, from a runway capacity perspective, it would not be desirable to mix lighter general aviation aircraft that operate at North Field with larger aircraft flown by the passenger airlines.

As stated before, input and recommendations provided by members of the Stakeholder Advisory Committee on potential future terminal development should not necessarily be considered implicit endorsement of future terminal expansion at OAK.

4.3 Air Cargo Development

Just as there is not a strong link between air cargo weight and cargo airline operations (see discussion in Section 3.3), there is also not a strong link between these metrics and the amount of land area required for air cargo facilities at OAK. Professional judgment and experience, however, suggest that if the Port pursued an aggressive air cargo marketing and development strategy, a significant amount of new facilities and land area would be required. However, as described in Section 3.3, it is recommended that the Port not pursue an aggressive air cargo development program, and instead allow existing tenants to grow at their existing and/or relocated facilities, with modest expansions, as necessary. This strategy results in the low air cargo growth forecast described in Section 3.3, and forms the basis of the potential air cargo development areas described below.

Figure 4.15 shows four areas that were considered to potentially accommodate future air cargo needs at the Airport. Planning considerations for each of the four areas are shown on the figure. The areas include:
- Area 1, North Field (north of Runway 9L/27R) — this area would provide approximately 180 acres for potential new air cargo development;
- Area 2, the Central Basin (south of Ron Cowan Parkway and north of Taxiway W) — this area would provide approximately 330 acres for potential new air cargo development;
- Area 3, south of Ron Cowan Parkway and north of the existing FedEx Metroplex — this area would allow for a modest expansion of existing FedEx facilities; and
- Area 4, the existing air cargo area at South Field and the Oakland Maintenance Center site — this area would allow modest expansion and/or relocation of existing air cargo facilities (e.g., the existing UPS / cargo building).
Figure 4.16 shows a sample air cargo development concept developed for Area 1. As shown on the figure, the Infield Road from the Airport Development Program would provide landside access from Doolittle Drive and Earhart Road to the North Field cargo area. Runway 15-33 would be closed to accommodate a large multi-tenant cargo facility. Additional facilities would potentially be provided east of Hangar 10. These facilities could potentially accommodate all air cargo activity at the Airport.

Figure 4.17 shows sample air cargo development concepts developed for Area 2 and Area 4. As shown on the figure, the air cargo development in Area 2, the Central Basin, would accommodate non-FedEx cargo carriers at OAK but is confined by existing roadways (i.e., Airport Drive and Ron Cowan Parkway). The Area 2 site could potentially accommodate all air cargo activity at the airport.

Development of Area 4, near the current Oakland Maintenance Center, would accommodate non-FedEx cargo carriers at OAK but is confined by existing roadways (i.e., Airport Drive and Ron Cowan Parkway) and Taxiway B. Development in this area would separate air cargo facilities from the passenger airfield facilities while retaining the existing access on both landside and the airfield. Regardless of any future terminal development plans, UPS, which currently operates from the cargo building, has expressed interest in relocating their operation to Area 4 near the Oakland Maintenance Center to consolidate their operation so that it runs more efficiently with improved ground access (i.e., their trucks would be able to exit Airport Drive sooner and not mix with airline passenger traffic as long).

A development concept for Area 3 is not shown as this site could only really be used for an expansion of the FedEx Metroplex.

Based on (1) the low growth in air cargo weight and operations anticipated through 2010 (due to not pursuing an aggressive air cargo growth strategy described above) and (2) input from the Stakeholder Advisory Committee, it is recommended that the area designated for potential growth in air cargo be located at existing air cargo facility locations (such as the FedEx Metroplex), with small expansions, as needed, into Area 3 (for FedEx) and a possible relocation of air cargo facilities within Area 4 (e.g., to accommodate potential new terminal development).

### 4.4 General Aviation Development

This section presents land area requirements for the near-term planning horizon (2010) and long-term planning horizon (2025) to accommodate based general aviation aircraft forecasts developed in Chapter 3. This section then describes potential general aviation development areas on the Airport.

<table>
<thead>
<tr>
<th>Area Required for General Aviation Aircraft (Acres)</th>
<th>Table 4.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet/Turboprop (1)</td>
<td>Piston/Helicopter (2)</td>
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<tr>
<td>Existing [A]</td>
<td>44</td>
</tr>
<tr>
<td><strong>Net New Area Required (Compared to Existing)</strong> [B]</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>3 to 7</td>
</tr>
<tr>
<td>2025</td>
<td>14 to 20</td>
</tr>
<tr>
<td><strong>Total Area (existing plus net new area required)</strong> [A+B]</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>47 to 51</td>
</tr>
<tr>
<td>2015</td>
<td>58 to 73</td>
</tr>
</tbody>
</table>

1. Jet and turboprop aircraft are similar in size and therefore have similar area per aircraft requirements.
2. Piston and helicopter aircraft are similar in size and therefore have similar area per aircraft requirements.

#### 4.4.1 Requirements (2010 and 2025)

Section 4.3.3 describes the forecasts of based general aviation aircraft at OAK. The first step is to convert these forecasts to land area requirements based on existing general aviation area allocations and associated number of aircraft parking positions (either on a ramp or in a hangar). Based on existing hangar and ramp area used for general aviation at OAK, the approximate area required is between 0.47 and 1 acres for jets and turboprops (per aircraft), and between 0.09 and 0.15 acres for piston airplanes and helicopters (per aircraft). Multiplying these area requirements by the forecast number of based aircraft yields the total land area required to accommodate the forecast number of based general aviation aircraft.

In 2010, it is estimated that an additional 11 to 22 acres of land (beyond the area required for 2010, or 14 to 29 acres more than existing) would be required to base jets and turboprops at OAK. It is estimated that no additional land would be required for piston aircraft and helicopters (beyond the area required for 2010).

Table 4.2 summarizes the estimated land areas required to meet the forecasts for based general aviation aircraft. The calculations summarized above are contained in detail in Appendix G.
It is important to note that not all of this demand may be met at OAK. The forecasts of based general aviation aircraft and associated land area requirements are unconstrained and represent an estimate of what would “naturally” occur at OAK, assuming appropriate facilities, such as ramps and hangars, are available for use. The following section examines possible areas on the Airport to meet the projected general aviation land requirements described above. Any actual development would be subject to further study, engineering and environmental evaluations, and financial constraints.

4.4.2 Potential General Aviation Development Areas

Figure 4.18 shows four possible areas for general aviation development at North Field, as well as relevant planning considerations for each. In general, future general aviation development at North Field consists of ramps and hangars for aircraft parking (i.e., for based aircraft). Most future general aviation development will likely be large hangars for jets and turboprops and smaller groups of hangars (like T-Hangars or Box Hangars) for piston aircraft and helicopters. Ramp area is also required to support aircraft maneuvering and access to hangars.

The brown areas on Figure 4.18 are areas that are currently undeveloped (except for taxiways, in some areas) and could support future general aviation development. Area 1 would be most suited for smaller piston aircraft and helicopters (as opposed to corporate jets and turboprops), whereas Areas 2 and 3 would be suited for any type of general aviation development. Because Areas 1 through 3 are undeveloped, any general aviation development in these areas would require considerable site preparation (e.g., grading, engineered fill, etc.) and utility upgrades and extensions (e.g., power, sewer, storm water drainage, communications, etc.). Appropriate planning considerations for possible general aviation development in Areas 1 through 3 are shown on Figure 4.18.

The blue area on Figure 4.18, Area 4, shows existing facilities (hangars and ramps) at North Field (many of which are currently used for general aviation) that could be redeveloped and/or renovated to provide state-of-the-art general aviation facilities to meet future demand. Many of the existing buildings (hangars) and/or sites in Area 4 are either not well configured compared to modern aircraft hangars, or do not meet current fire and seismic design requirements. Planning considerations associated with redeveloping the existing general aviation uses in Area 4 are presented on Figure 4.18.

Another possibility (not shown on Figure 4.18) is to locate general aviation facilities, such as fixed base operators, at South Field, in the Central Basin, north of Taxiway W and west of Taxiway B, for example. The basic premise is that aircraft accessing this new facility may be more inclined to use Runway 11-29 at South Field (as opposed to the runways at North Field), reducing the number of general aviation aircraft (e.g., corporate jets) that land and take-off at North Field, and possibly reducing the associated noise effects in the surrounding communities. However, developing general aviation facilities at South Field has some challenges that would likely be difficult to overcome and may not reduce the effects of aircraft noise. First, any general aviation development at South Field would likely require filling a significant amount of wetlands. It might be difficult to obtain permits to fill these wetlands because North Field is a viable alternative (as evidenced by its use today for general aviation operations). Not only are there potential environmental consequences associated with filling wetlands, but there are associated engineering and financial issues as well. Many of the existing on-Airport wetlands are used to support the overall storm water drainage system at the Airport. Although most corporate jets and large turboprops (98%) already take-off on Runway 29 in west plan (in accordance with voluntary noise abatement procedures), locating large general aviation facilities at South Field may cause a significant increase in the number of corporate jets and large turboprops that also land on Runway 29, increasing congestion and delay at South Field. Finally, there might be some small piston aircraft and helicopter operations that would occur with the development of such facilities at South Field. From a runway capacity perspective, these smaller, lighter aircraft do not mix well with the larger aircraft flown by the passenger and cargo airlines.

Therefore, it is recommended that Areas 1 through 3 be considered to meet the land area requirements for based general aviation aircraft at OAK, subject to market conditions and developer interest. Areas 1 through 3 could be developed either by the Port or a tenant or a third-party developer in association with the Port (which might need to extend and upgrade utilities and/or other basic infrastructure). Further, Area 4 could be considered for redevelopment as opportunities arise.

4.5 Airline-Related Support Facilities Development

Airline-related support facilities include belly cargo, provisioning and catering, fuel load rack, ground service equipment (GSE) maintenance, GSE storage and GSE parking areas, ground runup enclosure (GRE), airport rescue and firefighting (ARFF) station, triturators, and fuel storage. Some airline-related support facilities are currently located on the Airport, and new facilities would only be required if the existing facilities are displaced by another (presumably higher and better) use. Examples include belly cargo, provisioning and catering, fuel load rack, GRE, and the ARFF station.
Because a potential future terminal was identified in the area east of Taxiway B, north of existing Terminal 1, and south of Ron Cowan Parkway, some airline-related support facilities in this area, such as belly cargo and some airline provisioning facilities, may need to be relocated to other areas, if a terminal were indeed pursued in this area.

Some airline-related support facilities are not currently located at OAK, such as GSE maintenance. Based on airline requests for such a facility, a new GSE maintenance facility is required and recommended for further study. Additionally, the airlines have requested that the triturator facility be expanded and upgraded. A renovated and upgraded triturator facility is also required and recommended for further study in the master plan.

Figure 4.19 shows various areas on the Airport that might be suitable to locate the various airline-related support facilities. The matrix on the figure identifies which airline-related support facilities would be suitable in each of the 12 potential on-Airport development areas. Planning considerations for each type of use are also presented.

Many of the airline-related support facilities should be located as close to the terminal complex as possible, making Area 1 (and some of the surrounding areas) attractive. However, the terminal area is already quite congested and will likely be more so in the future (e.g., with potential future terminal development). The need for airline-related support facilities in Area 1 will need to be balanced with other uses competing to be located in Area 1.

4.6 Ground Access Development

4.6.1 Introduction

FAA AC No. 150/5070-6A, Chapter 6, Requirements Analysis and Concepts Development (Section 3, Development Assessment) provides scant information on the study of ground access. Development criteria and goals used in recent ground access development at OAK (including the recently completed Airport Roadway Project and the new roadway and curbside expansion project) have been applied to the development of any future sites. An important planning consideration in ground access development is proximity of parking sites to activity centers at the terminals and transport between the two. There are 13 different potential ground access development areas identified on Figure 4.20, for the following four categories: potential parking development (nine areas), access and roadways (two areas), ferry access (two areas), and a preferred regional rail connection corridor (i.e., BART Connector). Planning considerations for each of the ground access development area categories are shown on the figure.

4.6.2 Parking Areas

The potential Airport parking areas are shown in Areas 1 through 9 on Figure 4.20. Area 1 depicts the extent to which the current parking bowl will expand after the current roadway and curbside expansion project is complete. It includes the current Hourly and Daily Lot A parking areas, and serves both Terminals 1 and 2.

Areas 2 and 3 would be accessed from Airport Drive via the new John Glenn Drive. Area 2 encompasses the current Daily Lot B, Southwest Provisioning Building, Oakland Maintenance Center (OMC) hangar and airfield ramp area, and the OMC employee parking area. Area 3 is the current Economy parking lot.

Areas 4 and 5 would be accessed from Neil Armstrong Way via the Ron Cowan Parkway underpass at Airport Drive. Area 4 includes the Neil Armstrong Way employee lot and adjacent construction lay-down areas; Area 5 is currently used as a construction lay-down area.

Area 6, north of the FedEx Metroplex that includes wetlands and other undeveloped land parcels, could be accessed from Ron Cowan Parkway or Air Cargo Way. A possible terminal area connection to Area 9 (located adjacent to Doolittle Drive) may require development of an access route within Area 11.

4.6.3 Access / Roadways

Airport Drive provides public and non-public access and is the main circulation roadway at the Airport, with direct connection to Interstate Highway 880 via Hegenberger Road and 98th Avenue, and to the surrounding communities via State Highway 61 (Doolittle Drive and Davis Street). Access to on-Airport FedEx cargo facilities from Airport Drive is provided via Ron Cowan Parkway and Air Cargo Way. An important planning consideration is to separate airline passenger traffic from other vehicles on the main inbound roadway to enhance safety and simplify wayfinding. Airport Drive becomes a one-way, two-lane (soon to be three-lane, with the new roadway and curbside expansion project) loop roadway in the terminal area that provides access to public and employee parking lots and the terminal curbsides. Adjacent to the terminal curbsides, the roadway is comprised of three inner and two outer lanes, in addition to single loading lanes at the terminal and island curbsides.

The current roadway system, which is under construction in the loop area until 2008, is expected to accommodate passenger demand increases anticipated due to the expansion and renovation of Terminal 2.
Future roadways on the Figure 4.18 are shown in white. As the Airport expands, it may become necessary to consider other access options for either egress from the Airport or expanding the loop roadway and parking bowl in Area 1. Area 10 ties the existing outbound roadway into the outbound roadway at the perimeter of the golf course (over a viaduct or supported by fill). The Area 10 roadway would allow for expansion of the loop roadway system and parking bowl, but would encroach on existing wetlands. Area 11 would provide a new connection to Doolittle Drive, potentially for both public and non-public access.

Area 10 is considered an attractive option for future roadway development, as compared with Area 11. The Area 11 concept is based on gaining access to the potential Eden Road improvements that could provide long-term subsidiary access useful for non-public or construction purposes. However, access through Area 11 would be an expensive non-public option and would encourage the undesirable use of Davis Street if developed for public Airport access. The City of San Leandro representatives on the Stakeholder Advisory Committee discouraged the Port from considering Area 11 for potential future roadway development, and it is therefore not recommended in the master plan.

4.6.4 BART Connector

The currently planned corridor for the BART Connector, the automated people-mover connection to the regional rail transit system, is shown on the figure with a blue dashed line. Following are BART Connector planning considerations:

- Constrained access corridor between outbound lanes of Airport Drive and the golf course;
- At-grade alignment preferred (where possible) to minimize the cost of the guideway;
- Airport station should serve existing and potential future terminal, and allow for potential new garage and other on-Airport facility development;

The estimated time of completion for the BART Connector is uncertain and depends on when the project starts, which depends on the availability of funding. In the meantime, the Port is examining all available options for incorporating the BART Connector into the Port’s planning. If the BART Connector project begins, it would require at least 4 years to be constructed. The development of the Airport station will be planned and designed to tie into terminal facilities built on the Airport, as well as any potential parking garage. The BART Connector is a joint project between the Port and BART, with the Port providing significant funding and staff involvement in acquiring other funding. BART is the contracting agent and will construct and operate the system.

4.6.5 Ferry Access

Areas 12 and 13 on Figure 4.20 depict two potential cargo ferry areas (Areas 12 and 13). In 1998, FedEx commissioned a team to investigate the potential for cargo ferry service between the Peninsula and OAK using hovercraft. FedEx had previously considered such an option for transit from John F. Kennedy International Airport to Wall Street in New York. FedEx, UPS, Airborne Express and DHL (now ABX Air / DHL) were interested but unable to agree on the location of the facility on the Peninsula and configuration of the inside of the hovercraft. Alaska Airlines and United Airlines were also interested in using the service to transport parts for their maintenance facilities at OAK, but those have since closed. After further study, it is evident that the potential environmental effects would also be substantial and may be cost prohibitive. Consequently, no action has been taken on the cargo ferry project and none is anticipated in the near-term (2010) planning horizon.

Areas 12 and 13 on Figure 4.20 could also be considered for passenger ferry access to and from OAK. Passenger ferries could provide service to/from Bay Area ferry terminals (e.g., the Ferry Building in downtown San Francisco or the Larkspur Ferry Terminal in Marin County) or San Francisco International Airport. Because these ferries would be accessing the airfield, there are significant safety and security issues that would need to be addressed. Passenger ferry access is not anticipated in the near-term (2010) planning horizon, but could be considered longer-term depending on roadway congestion and markets served at OAK and San Francisco International Airport.
Figure 4.1

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Planning Considerations

- Possible replacement terminal facilities (could more easily allow for parallel runway north of Runway 11/29)
- Greenfield site (less disruption to operations during construction, no design constraints/efficient terminal layout/maintained walking distances, no existing facilities to relocate)
- Expensive site preparation (i.e., large amount of fill, grading, soil preparation, environmental/wetlands mitigation)
- Environmentally constrained site (i.e., wetlands, wildlife, etc.)
- Good airfield access (gates near runway)/site can accommodate remote aircraft parking
- Adequate area for new access roads and parking spaces
- Separate terminal operations area
- Difficult wayfinding for airline passengers (i.e., there would be two distinct terminal areas)
- Difficult/expensive BART Connector alignment
- Possible increase in vehicle trips to/from Airport through Alameda
- Moves terminal closer to residential areas

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Planning Considerations

- Greenfield site (less disruption to operations during construction, no design constraints/efficient terminal layout/reroute walking distances, no existing facilities to relocate)
- Expensive site preparation (i.e., large amount of fill, grading, soil preparation, environmental/wetlands mitigation)
- Environmentally constrained site (i.e., wetlands, wildlife, etc.)
- Good airfield access (gate near runway/site can accommodate remote aircraft parking)
- Adequate area for new access roads and parking
- Separate terminal operations area
- Difficult wayfinding for airline passengers (i.e., there would be two distinct terminal areas)
- Difficult/expensive BART Connector alignment
- Possible increase in vehicle trips to/from Airport through Alameda
- Adds terminal closer to residential areas

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Planning Considerations

- Adds onto existing Terminal 1
- Relatively short walking distances (no longer than existing)
- Relatively inexpensive site preparation and terminal development
- Must relocate existing facilities (e.g., cargo and airport operations buildings)
- May need to demolish Oakland Maintenance Center hangar
- Possible impact to international arrivals aircraft parking
- Minimal/no environmental site impacts
- Good airfield access (gates near runway)
- Difficult curbside operations (insufficient curbside length and the Terminal 1 curbside is already congested)

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Potential Terminal Development Concept 2B

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Planning Considerations

- New unit terminal northwest of Terminal 1 (near Terminal 1)
- Relatively short walking distances
- Relatively inexpensive site preparation and terminal development
- Must relocate existing facilities (e.g., cargo building)
- May need to demolish Oakland Maintenance Center hangar
- Impact to international arrivals aircraft parking
- Minimal/no environmental site impacts
- Good airfield access (gates near runway) likely requires new taxiway parallel to Taxiway B
- Difficult curbside operations (short weave distance between new unit terminal and Terminal 1)
- May require new pedestrian connection from proposed BART Connector station to new unit terminal

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Planning Considerations

- New unit terminal northwest of Terminal 1 (near Oakland Maintenance Center)
- Relatively short walking-distances
- Relatively inexpensive site preparation and terminal development
- Must relocate existing facilities
  (e.g., Southwest Airlines’ new provisioning building, cargo building)
- Must demolish Oakland Maintenance Center hangar
- No impact to international arrivals aircraft parking
- Minimal/low environmental site impacts
- Long taxi distances to northernmost gates
  likely requires new taxiway parallel to Taxiway B
- Less difficult curbside operations
  (longer weave distance between new unit terminal and Terminal 1)
- Consumes considerable amount of vehicle parking (in existing Daily B)
- Would require additional BART Connector station at new unit terminal
Planning Considerations

- New unit terminal northwest of Terminal 1
- Preserves more landside area for access/curbides and/or vehicle parking
- Relatively short walking distances
- Relatively inexpensive site preparation and terminal development
- Must relocate existing facilities (e.g., cargo building)
- May need to demolish Oakland Maintenance Center hangar
- Impact to international arrivals aircraft parking
- Minimal/no environmental site impacts
- Likely require new taxiway parallel to Taxiway B; aircraft at northwestern gates push onto new taxiway parallel to Taxiway B
- Difficult curbside operations (short weave distance between new unit terminal and Terminal 1)
- May require new pedestrian connection from proposed BART Connector station to new unit terminal

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Planning Considerations

- New unit terminal northwest of Terminal 1 splits terminal from concourse to allow for bypass roadway access to existing Terminals 1 and 2
- Improved roadway and curbside operations/minimal weaving
- Longer walking distances than other Area 2 terminal options
- Relatively inexpensive site preparation but more expensive terminal development than other Area 2 terminal options
- Must relocate existing facilities (e.g., cargo building)
- Must demolish Oakland Maintenance Center Hangar
- Impact to international arrivals aircraft parking
- Minimal/no environmental site impacts
- Good airfield access (spans near runway) likely requires new taxiway parallel to Taxiway B
- Consumes considerable amount of surface vehicle parking area
- May require new pedestrian connection from proposed BART Connector station to new unit terminal

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Planning Considerations

- New unit terminal on Oakland Maintenance Center site
- Relatively short walking distances
- Relatively inexpensive site preparation and terminal development
- Must relocate Southwest Airlines’ new provisioning building
- Must demolish Oakland Maintenance Center hangar
- May need to demolish a portion or all of the cargo building
- No impact to international arrivals aircraft parking
- Minimal/no environmental site impacts
- Long taxi distances to/from South Field runway/Body requires new taxiway parallel to Taxiway B
- Less difficult curbside operations (longer weave distance between new unit terminal and Terminal 1)
- Cargo truck traffic must mix with airline passenger traffic
- Would require new BART Connector station at new unit terminal
Planning Considerations

- New remote (off-Airport) unit terminal with automated people mover link to/from concourse
- New remote unit terminal would not impact traffic operations in existing on-Airport terminal area
- Limited available off-Airport sites for new unit terminal
- Port would need to purchase additional land for new remote unit terminal
- Expensive automated people mover link
- Separate terminal operations area
- Would require mechanism to securely transfer checked baggage to/from concourse
- Must relocate existing facilities (e.g., cargo building)
- Impact to international arrivals aircraft parking
- Minimal/no environmental site impacts on Airport
- Good airfield access (gates near runway) likely requires new taxiway parallel to Taxiway B
- Difficult wayfinding for airline passengers (i.e., there would be two distinct terminal areas)
- Airlines may not staff remote unit terminal and concourse
- Possible conflicts with BART Connector alignment and/or golf course
Planning Considerations

- New consolidated terminal north of existing terminals (consolidates existing terminal functions – bag claim, ticketing, etc. – in new building north of existing terminals)
- May need to demolish a portion or all of the cargo building
- Must demolish the Oakland Maintenance Center hangar
- No impact to international arrivals aircraft parking
- Minimal/no environmental site impacts for terminal roadways would likely need to traverse wetlands
- Good airfield access (gates near runway)/likely requires new taxiway parallel to Taxiway B
- Requires a two-level curbside roadway (which is relatively expensive)
- Relatively short walking distances to new gates; relatively long (excessive) walking distances to existing gates
- Relatively expensive; must replace existing facilities (bag claim, ticketing, etc.) in new consolidated terminal and remodel existing buildings into a different use (e.g., hold rooms)

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Planning Considerations

- Extension of current Terminal 2 extension project
- Expensive site preparation (i.e., large amount of fill, grading, soil preparation, environmental/wetlands mitigation)
- Does not provide new terminal facilities (e.g., ticket counters, security checkpoint, baggage claim, etc. to accommodate passengers through new gates)
- Does not provide new curbside (the Terminal 2 curbside is already congested)
- Good airfield access (gates near runway)
- Site can accommodate remote aircraft parking
- Long walking distances
- Adds terminal closer to residential areas
- May not be feasible due to airspace height restrictions

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**Planning Considerations**

- Expansion of current Terminal 2 renovation and extension project
- Expensive site preparation, including 30+ acres of Bay fill (likely not affordable)
- Environmentally constrained site (e.g., Bay fill, wetlands, wildlife, etc.)
- Good airfield access (gates near runway) / site can accommodate remote aircraft parking
- Difficult curbside development (Terminal 2 curbside is already congested)
- Adds terminal closer to residential areas

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Planning Considerations

**Area 1**
- Provides a significant amount of area for new air cargo development (± 180 acres)
- Requires closure of Runway 15/33 (for full site development)
- For larger aircraft, long taxi distances to/from South Field runways (for noise abatement procedures)
- Significant mixing of larger air cargo aircraft and lighter general aviation aircraft at North Field
- Would require new roadway connections to Doolittle Dr (State Rte. 61) and/or Harbor Bay Parkway to provide sufficient landside access
- Requires a significant upgrade to North Field infrastructure (e.g., storm drains, sewers, power, data/communications, etc.)

**Area 2**
- Provides a significant amount of area for new air cargo development (± 330 acres)
- Expensive site preparation (i.e., large amount of fill, grading, soil preparation, environmental wetlands mitigation)
- Environmentally constrained site (i.e., wetlands, wildlife, etc.)
- Possible conflicts with potential terminal development area (still being considered by Stakeholder Advisory Committee)
- Good airfield access (site near South Field runways for noise abatement procedures)
- Possible good site access via Ron Cowan Parkway

**Area 3**
- Would allow for modest expansion of FedEx’s existing site/facilities (± 29 acres)
- Some environmental constraints (i.e., wetlands)

**Area 4**
- Provides for modest expansion and/or relocation of existing cargo facilities in this area (± 40 to 90 acres)
- Possible conflicts with potential terminal development area (still being considered by Stakeholder Advisory Committee)
- Adequate airfield access (site near South Field runways for noise abatement procedures)
- Depending on site within this area, may require mixing of cargo truck traffic and airline passenger vehicle traffic

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Planning Considerations

Area 1
- Provides 20 acres ± for new general aviation (e.g., hangar) development
- Access would likely need to be from Harbor Bay Parkway
- Good site to consolidate smaller general aviation hangars (e.g., replacement facilities for older hangars, such as the new “T” hangars and Port-A-Ports)
- Somewhat longer taxi distances to Runways 27L/R and 33 (than from existing new “T” hangars and Port-A-Ports)
- Extensive use of the site would require relocating the City of Oakland soccer fields
- Unknown site preparation requirements and utility upgrades (possibly extensive and expensive)
- Moves general aviation development closer to residential areas (compared to existing Area 4)

Area 2
- Provides 65 acres ± for new general aviation (e.g., hangar) development
- Access would likely need to be from Harvest Bay Parkway
- Possible site for new corporate jet facilities (i.e., hangars and related offices)
- Taxiway infrastructure may need to be upgraded
- Short taxi distances for landing aircraft (Runways 27L/R), but long taxi distances for departing aircraft (Runway 29 for noise abatement)
- Possible conflicts with potential air cargo development area (still being considered by Stakeholder Advisory Committee)
- Unknown site preparation requirements and utility upgrades (possibly extensive and expensive)
- Moves general aviation development closer to residential areas (compared to existing Area 4)

Area 3
- Provides 15 acres ± for new general aviation (e.g., hangar) development
- Hangar development in this area would likely require a new landside roadway with a connection to Earhart Rd. and/or Doolittle Dr. (State Rte. 61)
- Short taxi distances for landing aircraft (Runways 27L/R), but long taxi distances for departing aircraft (Runway 29 for noise abatement)
- Possible conflicts with potential air cargo development area (still being considered by Stakeholder Advisory Committee)
- Unknown site preparation requirements and utility upgrades (possibly extensive and expensive)
- Moves general aviation development closer to residential areas (compared to existing Area 4)

Area 4 (Redevelopment)
- Upgrades and/or redevelops existing (but aging) general aviation (or other aviation) facilities at North Field
- Relatively good landside access on existing roadways at North Field
- Taxi distances the same as existing
- Possible asbestos and lead paint issues
- Requires mixing of various types of aircraft (piston, jet, cargo, etc.)

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